

accomplished will become apparent ; whether by wheel and pinion, by a stud, by stiff friction, or by any other method.

7. All the adjustments which are necessary in order to set the machine in action will be pointed out, and the order in which they ought to be made will be indicated.

8. The whole course of action of every part will be visible in every stage of the progress of the machine. If it is a wheel, the time and direction of its motions will appear, and also the times at which it rests ; if the part is a bolt or click, the times at which it is bolted or locked, and those during which it is in the reverse state, will be seen. These particulars will be discovered by casting the eye down the vertical line belonging to each part, which was named at the top of the drawing.

9. In passing the eye along any of the horizontal lines, dividing the cycle of the engine movements, every cotemporaneous motion, as well as its direction, at that precise time becomes visible ; as also the position of those parts which are at rest.

The author then proceeds to state, that he found much time to be saved in the construction of his calculating engine by employing this mechanical notation ; and he has, by way of example, in this paper described its application to the hydraulic ram, and to the common eight-day clock, of both of which he has given the drawings and notation.

*On the Parallax of the fixed Stars.* By J. F. W. Herschel, Esq. M.A. Sec. R.S. Communicated January 19, 1826. Read March 9 and 16, 1826. [*Phil. Trans.* 1826, p. 266.]

The measurement of the distance between the two stars composing a double star, at opposite seasons of the year, has long ago been suggested as a means of detecting a difference of parallaxes between them, if any exist ; but in practice has not proved delicate enough for the purpose, owing to the difficulty with which measures of distance are still attended when minute fractions of a second are to be determined. The author observes that it appears hitherto to have escaped notice that a difference of the parallaxes will affect not only their distance from each other, but also their angle of position, and that this latter effect is much more sensible and measurable for a given amount of parallax than the former ; and he accordingly proposes it as a means of determining the question as to the existence or non-existence of a sensible difference, in all stars favourably situated.

He first enters into an estimate of the least amount of such difference which this method is capable of detecting, with our present instruments and methods of observation, which, for two stars at 3'' distance from each other, he states to be one fortieth of a second, and in closer stars a still smaller fraction.

In selecting stars for examination, the most favourable position in

which parallax most affects the angle of position is when the great circle passing through both stars, passes also through the pole of the ecliptic. But to ascertain how far any particular star is or is not favourable to the application of the method, and the times of the year when it ought to be observed, it is necessary to make a calculation, the mathematical principles of which the author explains; and includes, in proper formulæ, which he then applies to the formation of a list of about 70 stars, as a specimen.

He concludes by observing, that by a certain mode of using the double image-position micrometer, first explained to him by Captain Kater, the application of this method ceases to be limited to close stars; and that stars of any moderate distance, otherwise favourably situated, may be equally well subjected to examination with nearer ones; and that thus the range of objects placed within our power becomes unlimited.

*A Formula for expressing the Decrement of Human Life. In a Letter addressed to Sir Edward Hyde East, Bart. M.P. F.R.S. By Thomas Young, M.D. For. Sec. R.S. Communicated February 2, 1826. Read April 19, 1826. [Phil. Trans. 1826, p. 281.]*

The author first observes that an opinion is generally prevalent, of a decided increase in the average duration of human life in many parts of Europe; but he yet regards it as probable that this improvement has been much exaggerated, partly on account of the limited number of persons on whom the observations have been made, and partly from erroneous views respecting the profits of assurance companies.

He then examines the evidence on which this opinion rests, and gives a comparative statement of the annual average of mortality, the mean term of full life, and the mean age of mankind, according to a great number of different authorities; and considers that a prolongation of life to the extent of one year in eight, is a much fairer estimate than one in three, which some have maintained, even on the limited grounds of the experience on which they have reasoned.

Another mode, he observes, of easily appreciating the regularity and analogies of tables is the construction of a curve in which, the abscissa representing the age, the ordinate shall represent the corresponding decrements of life. This he accordingly does, and its inspection he observes is sufficient to render us suspicious of the accuracy of the Carlisle tables; while he considers a combination of these and the Northampton tables, and the London parish registers, as likely to give the fairest estimate.

After commenting on the various documents before him, the author next proposes the formula mentioned in the title, which consists of terms having respectively a preponderating influence in infancy, in youth, in middle age, and in old age.

This is followed by a series of numerical documents, and the values of the formula calculated for each year; and the curve corre-